



SLR.24
1 Oct 99

**UNITED STATES MARINE CORPS
WEAPONS TRAINING BATTALION
MARINE CORPS COMBAT DEVELOPMENT COMMAND
QUANTICO, VIRGINIA 22134-5040**

DETAILED INSTRUCTOR GUIDE

LESSON TITLE

LOW-LIGHT/DARKNESS ENGAGEMENT TECHNIQUES

COURSE TITLE

SUSTAINMENT LEVEL RIFLE MARKSMANSHIP (PHASE I, II, III)



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Weapons Training Battalion
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INSTRUCTOR PREPARATION CHECKLIST

ESSENTIAL DATA

LESSON DESIGNATOR	SLR.24
LESSON TITLE	Low-Light/Darkness Engagement Techniques
DATE PREPARED	1 October 1999
TIME	40 min
METHOD	Lecture
LOCATION	Indoor/outdoor classroom
INSTRUCTORS REQUIRED	One Primary Marksmanship Instructor (PMI)
REFERENCE	MCRP 3-01A
TRAINING AIDS/EQUIPMENT	Slides (sSLR.24-1 - sSLR.24- 3)



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DETAILED OUTLINE

LOW-LIGHT/DARKNESS ENGAGEMENT TECHNIQUES

INTRODUCTION

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1. **GAIN ATTENTION.** An effective combat marksman must be prepared to detect and engage targets under a variety of conditions. Factors such as terrain and opportunity often dictate that the Marine engage combat targets at night or under low-light conditions. Because vision is limited, you must learn and practice the techniques of night observation to detect targets and distinguish objects at night. In addition, you must develop skills to accurately engage targets regardless of the limited visibility of the nighttime or low-light environment. In combat, you must be as effective and confident in shooting at night as in daylight.

2. **OVERVIEW.** This lesson covers night vision adaptation, target detection, types and effects of illumination, and techniques for engaging targets during low light and darkness.

3. **INTRODUCE LEARNING OBJECTIVES.** The Terminal Learning Objective and Enabling Learning Objectives pertaining to this lesson are as follows:

a. **TERMINAL LEARNING OBJECTIVE.** Given an M16A2 service rifle, sling, cartridge belt, magazines, magazine pouches, flak jacket, helmet, suspenders, ammunition, a target, and artificial illumination, during periods of low light and darkness, without the aid of references, engage targets in low light (without illumination) and in darkness (with illumination) IAW MCRP 3-01A and to achieve a proficiency level IAW MCO 3574.2_. (PVTX.11.7)

b. **ENABLING LEARNING OBJECTIVES**

1) Given targets, during periods of low light and darkness, without the aid of references, employ low-light and darkness observation skills to detect targets IAW MCRP 3-01A. (PVTX.11.7c)

2) Without the aid of references, identify the effects of illumination on targets IAW MCRP 3-01A. (PVTX.11.7d)



INSTRUCTOR'S NOTE: A load-bearing vest may be substituted for magazine pouches and suspenders. Gear will be worn in accordance with the MBST Handbook.

4. METHOD. The lesson will be taught in a classroom setting using lecture.

5. EVALUATION. Marines will be evaluated on topics from this lesson in a comprehensive written examination for Phase III following completion of lessons SLR.19 - SLR.29. Performance will be evaluated via a performance checklist in the Low-Light/Darkness Engagement Exercise, SLR.24A.

TRANSITION: The eyes are most effective when there is plenty of light allowing objects to have sharp outlines and bright colors. In darkness or low light, objects appear faint, lack sharp outlines, and appear to possess little or no color. The eye can compensate for the loss of light so that at night you do not completely lose your ability to see. An understanding of how the eye works in various light conditions, as well as factors that affect night vision, will help you take advantage of the eye's ability to see at night.

BODY
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1. (1 MIN) THE HUMAN EYE

Refer to slide sSLR.24-1.

The eye functions much like a camera, receiving, focusing, and organizing the light entering the eye. The retina is the part of the eye responsible for processing the light and translating it into recognizable objects. The retina contains cells known as cones and rods.

a. Cones. The cones are located mostly in the center of the retina. These cells need to receive a large amount of light to function properly. The cones allow an individual to identify color, shape, and contrast. They provide day vision.



b. Rods. The rods are grouped around the cones and are very sensitive to light. The rods are not normally used during daylight. They function when the light is too low for the cones to work effectively. The rods provide the ability to see at night. However, they are not capable of processing color, which is why the ability to distinguish colors is diminished at night--we can generally see only black, white, shades of gray, and general outlines. Rod cells are weak and tire quickly.

Confirm by questions.

TRANSITION: The ability to see at night can be improved by allowing the eyes to obtain and maintain night vision. Since adapting to night vision is a slow and gradual process, steps should be taken to protect night vision once it is attained.

2. (9 MIN) NIGHT VISION ADAPTATION AND MAINTENANCE

a. Night Vision Adaptation. In daylight or other bright light, the cones of the eye are active. In darkness or low light, the rods are active. Night vision adaptation occurs during the time required for the eyes to shift from the use of cones to the use of rods. This process is slow and there are no shortcuts. There are two methods for acquiring night vision:

1) The first method is to remain in an area of darkness for about 30 minutes. This area can be indoors or outdoors. The major disadvantage of this approach is that an individual is not able to perform any tasks while acquiring night vision in total darkness.

2) The second method is to remain in a darkened area under low intensity red light (similar to the light used in a photographer's darkroom) for about 20 minutes, followed by about 10 minutes in darkness without the red light. This method produces almost complete night vision adaptation while permitting the performance of some tasks during the adjustment period.

b. Night Vision Maintenance. Because the eyes take a long time to adjust to darkness, it is important to protect night vision once it is acquired. To maintain night vision:

1) Avoid looking at any bright light. Bright light will reactivate the cones in the eye and deactivate



the rods, eliminating night vision and requiring readaptation.

2) Shield the eyes from parachute flares, spotlights, or headlights.

3) When using a flashlight to read a map or other material:

a) Put one hand over the glass to limit the area illuminated and the intensity of the light. Keeping one eye shut will reduce the amount of night vision lost.

b) Cover the light with a red filter to help reduce the loss of night vision.

c) Minimize the time spent using a flashlight.

c. Factors Affecting Night Vision. Some physical factors may affect your night vision and reduce your ability to see as clearly as possible in low light or darkness. These factors include:

- 1) Fatigue.
- 2) Lack of oxygen.
- 3) Long exposure to sunlight.
- 4) Heavy smoking.
- 5) Drugs.
- 6) Headaches.
- 7) Illness.
- 8) Consumption of alcohol within the past 48 hours.
- 9) Improper diet.

Confirm by questions.

TRANSITION: Once you have acquired night vision, you are prepared to locate targets. Some of the observation techniques used in daylight, such as searching for target indicators, also apply at night or in low light. But night observation techniques must allow for the limitations of night vision and the need to protect it. In addition, the manner in which the field of vision is affected must be taken into



SLR.24
1 Oct 99

consideration when employing search methods at night.



3. (10 MIN) NIGHT SCANNING TECHNIQUES (TARGET DETECTION)

a. Off-Center Vision. Because of the placement of the cones in the center of the retina and the rods around the edges, the angle at which you observe an object at night will affect how well you can see it. Off-center vision is the technique of keeping the attention focused on an object without looking directly at it. This technique is effective at night since it maximizes the use of the rods that provide night vision and also because movement is easily detected with peripheral vision.

Refer to slide sSLR.24-2.

1) Never look directly at the object you are observing. You will see the object much better by using off-center vision. Look slightly to the left, right, above, or below the object. Experiment and practice to find the best off-center angle for you. For most people, it is about 6 to 10 degrees away from the object, or about a fist's width at arm's length.

2) Staring at a stationary object in the dark may make it appear to be moving. This occurs because the eye has nothing on which to reference the exact position of the object. This illusion can be prevented by visually aligning the object against something else, such as a finger at arm's length.

b. Scanning/Figure Eight Scan. Scanning is the use of off-center vision to observe an area or object and involves moving the eyes in a series of separate movements across the objective area.

Refer to slide sSLR.24-3.

1) A common method is to move the eyes in a figure eight pattern. The eyes are moved in short, abrupt, irregular movements over and around the area. Once a target indicator has been detected, your focus should be concentrated in that area, but not directly at it.

Pause a few seconds at each point of observation since the eyes cannot focus on a still object while in motion. You must rest your eyes frequently when scanning since the rods that produce night vision fatigue quickly, generally in about 4-10 seconds.



- 2) While you are observing, there may be periodic blackouts of night vision due to simple fatigue. This is normal and is not a cause for alarm. Night vision will quickly return after the eyes are moved and blinked a few times.
- 3) It is more effective to scan from a prone position or a position closer to the ground than the object being observed. This will create a silhouetted view of the object.
- 4) When scanning an area, look and listen for the same target indicators as in daylight: movement, sound, and improper camouflage.
 - a) Remember that objects in bright moonlight/starlight cast shadows just as in sunlight.
 - b) Sound always seems to be louder at night than during daylight.

Confirm by questions.

TRANSITION: In some combat situations, artificial illumination may be available to assist in locating targets. However, this light may affect your perception of the target and disrupt your night vision. Knowing the effects of illumination is important for accurate target engagement at night.

4. (5 MIN) TYPES AND EFFECTS OF ILLUMINATION

a. Types of Illumination

1) Ambient Light. Ambient light is the light produced by natural means (i.e., sun, moon, and stars). Considerable variations occur in ambient light due to the time of day, time of year, weather conditions, terrain, and vegetation.

2) Artificial Illumination. Artificial illumination is light produced by a process other than natural means. Artificial light can be used to illuminate an area for target detection or to illuminate a specific target to pinpoint its position. There are two types of artificial illumination used in combat: air and ground.

b. Effects. Both ambient light and artificial illumination can affect a Marine's perception of target



distance and size, as well as his night vision.

1) Light behind the Marine or between the Marine and the target will illuminate the front of the target and make it appear closer than it actually is.

2) Light beyond the target will display the target in silhouette, making it appear farther away than it is.
If the target is silhouetted, it is easier to see and easier to engage.

3) Air illumination devices will be in constant motion as they descend to the ground. This movement will create changing shadows on any illuminated target, causing a stationary target to appear as if it were moving.

4) The introduction of artificial light requires the eyes to make a sudden, drastic adjustment to the amount of light received. This can cause the temporary blinding effect that is experienced when night vision is interrupted abruptly. Ambient (natural) light can also have this blinding effect in certain conditions. For instance, an individual may be temporarily blinded or experience reduced night vision when a bright moon suddenly appears from behind clouds.

Confirm by questions.

TRANSITION: The fundamentals of marksmanship are employed for engagement of targets in low light or darkness just as they are in daylight. However, you must apply the principles of night vision and target detection when engaging targets at night.

5. (10 MIN) ENGAGEMENT OF TARGETS DURING LOW LIGHT AND DARKNESS

a. Combat Mindset. In the stress of the combat environment, you must have the ability to eliminate any hesitation, fear, or uncertainty of action and to focus on the actions to fire well-aimed shots. This is more important during low light and darkness than it is in daytime because your attention is more easily diverted and your sense of vision is reduced. This can create a shock of awareness as you rely more heavily on your other senses. Every noise, movement, and muzzle blast appears intensified at night. Throughout this training program we have emphasized that physical acts of shooting must become



second nature so your focus will not be diverted from firing well-aimed shots. It is critical to achieve the same level of results as in daylight shooting. This is accomplished through mental preparedness and training until shooting actions become instinctive.

b. Acquiring Targets at Night. Hold your head high so your eyes are well above your rifle sights. This will increase your field of view and improve the sharpness of detail. Keep both eyes open to get maximum visual coverage of the target area. Keeping both eyes open also improves depth perception.

c. Sight Alignment/Sight Picture

1) During low light or reduced visibility, flip the rifle's large rear sight aperture (marked "0-2") up. Using this larger aperture enables you to take greater advantage of whatever illumination is available to acquire sight alignment/sight picture.

2) Obtain stock weld and try to obtain sight alignment and sight picture just as you would in daylight. There is normally enough ambient light (from the moon and stars) to enable you to perceive objects as far as fifty meters away, especially if they are moving.

3) However, when rifle sights are placed on a dark background, such as a camouflaged target, you may not be able to acquire and align the sights clearly. You may have to rely almost entirely on your presentation to get the weapon on target. To check sight alignment and/or acquire your sights, point your rifle toward an area that provides a good contrast (such as the skyline), then bring your sights back on line with the target. As soon as you feel your sight picture is correct, you must shoot. There should be no hesitation.

4) Artificial illumination, particularly air devices, may make the target appear to move, disrupting your ability to obtain a proper sight picture. Under this condition, you may need to obtain sight alignment by focusing the sights on the lower portion of the target. This area of the target will be less affected by the shadows created by the illumination and provide a more stable aiming point. Once sight alignment has been established on this area of the target, raise the rifle sights to center mass and engage.

Confirm by questions.



TRANSITION: Night firing requires the Marine to be prepared physically by acquiring and maintaining night vision and mentally by focusing on the techniques for successful target engagement.



OPPORTUNITY FOR QUESTIONS:
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1. Respond to questions from the class.
2. Prompt Marines with questions to the class.
 - a. QUESTION: Why is it important to protect night vision once it is acquired?

ANSWER: Because it takes a long time for the eyes to readapt to darkness.
 - b. QUESTION: What two methods of target detection are effective in low light or darkness?

ANSWER: Off-center vision and scanning.
 - c. QUESTION: What should an individual do to help obtain sight alignment under low-light/darkness conditions?

ANSWER: Obtain proper stock weld and point the rifle toward an area that provides better contrast to enable acquisition of the sights.

INSTRUCTOR'S NOTE: Ask Marines as many questions as necessary to ensure they fully understand the material presented in this lesson.

SUMMARY:
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In combat, it is often necessary to engage targets in low light or darkness. To do so successfully, you must acquire and maintain night vision and understand the effects of illumination on the battlefield. Night observation skills and engagement techniques must be used to gain the advantage in the fight. Understanding the principles and using the techniques presented in this lesson will help you become an effective and confident rifleman in low light or darkness.



SLR.24
1 Oct 99

SLIDES

TABLE OF CONTENTS

<u>NUMBER</u>	<u>TITLE</u>
sSLR.24-1	THE HUMAN EYE
sSLR.24-2	OFF-CENTER VISION
sSLR.24-3	FIGURE 8 SCAN